



IS YOUR ROOF RUNOFF POLLUTED?

Facilities covered under the State NPDES Industrial Activities Storm Water General Permit should include roof runoff in their assessment of potential pollutant sources.

The Concern

Roof runoff in industrial areas can be a significant source of pollutants to stormwater. Early studies of roof runoff have shown that galvanized metal roofs are sources of zinc at concentrations two to twenty times greater than other urban source areas, and often produce runoff that exceeds acute toxicity for aquatic life. Materials, paints, and coatings associated with roofing are also suspected of being significant sources of copper and lead.

Local Studies/Findings

Studies conducted by the cities of San José and Sunnyvale show that metal finishing and electroplating processes contributed greater amounts of copper and nickel to stormwater runoff than other industrial and commercial activities.

Potential sources identified for copper and nickel in roof deposition included copper chloride etchers, ammonia etchers, and acid plating bath exhaust vents.

Deposition was visible at most facilities, ranging from a slight discoloration to a dark blue or deep green deposit. Leaks in exhaust pipes and containment vessels could be seen as localized deposition directly below the pipefitting. Air deposition of exhaust vapors could be seen as a plume radiating out from the exhaust pipe.

However, data from one of the pilot facilities showed that an absence of visual deposition does not imply an absence of pollutants.

To see an example of roof contamination go to: www.ci.san-jose.ca.us/esd/com-roof-runoff.htm

BMPs

There are a variety of Best Management Practices (BMPs) available to prevent rooftop pollution (see list at right).

An evaluation of various BMPs being implemented in the area in 2000 demonstrated the complexity and the effectiveness of some BMPs. For example, BMPs to control pollutant release from ammonia etcher exhaust vents vary.

The most basic type of control method is a vent cover and drip pan collection system. The vent cover provides a surface

for condensation of exhaust vapors and protects from rain entering the system. Condensate in the drip pan is plumbed to the waste treatment system or emptied manually. In some cases, ammonia etchant vapor condenses readily in the vent pipe. In other cases, the vapor contacts the vent cover and condenses into the collection pan. Sometimes, however, vapors escape to the atmosphere and condense on the roof.

To promote condensation, one facility employed chiller coils at the junction of the ammonia etcher and exhaust vent. This technique also helps reduce chemical loss.

Another BMP is to treat ammonia etchant vapors with a scrubber system. The effectiveness of the scrubber seems to depend on the type of scrubber solution used. Using plain water in the scrubber system was ineffective in controlling emissions, leaving deposits of copper salts on the roof. A dilute sulfuric acid solution seems to be the most effective means of treating exhaust vapors from an ammonia etcher.

BMPs TO CONSIDER

- **Install vent covers and drip pans where there are none.**
- **Prevent leaks in pipefittings and containment vessels with routine maintenance.**
- **Dispose of condensate from ventilation properly, or treat it.**
- **Promote condensation within piping containment, such as using chiller coils.**
- **Check that your scrubber solution is appropriate for the chemistry of the fumes.**
- **Look for chemical deposition around vents, pipes and other surfaces.**

The information provided here is intended to provide examples for consideration. It is the responsibility of a discharger to determine the applicability of any treatment to his/her facility.

DID YOU KNOW?

- Ventilation from etching equipment and acid plating baths can be a source of roof contamination.
- Sometimes roof runoff has higher Cu & Ni concentrations than runoff from chemical and waste handling areas.
- Roofs with no visible contamination may be a significant pollutant source.
- Scrubbers may be less effective than you think.

Actual Results from One Site

The table below shows that concentrations from a non-process rooftop at one printed circuit board manufacturer consistently produced the lowest values of the four monitoring areas. Parking lot runoff has higher contamination due to cars. For comparison purposes, non-process roof runoff can be a useful gauge for identifying contaminated runoff. The table below illustrates that the waste treatment area had higher pollutant concentrations than non-process and parking lot areas, and roof runoff from process buildings can be even higher.

STORMWATER RUNOFF — COPPER SAMPLES (mg/l)							
Time	Waste Treatment	Parking Lot	Process Roof			Non-Process Roof	
			Downspouts			Downspouts	
			A	B	C	A	B
First Sample	2.58	0.477	0.028	99.1	25.0	0.155	0.267
40 min. later	1.03	0.093	0.012	2.51	12.0	0.097	0.062
80 min. later	2.07	—	0.123	3.10	14.4	—	—
100 min. later	—	0.121	—	—	—	0.053	0.064
120 min. later	—	—	0.118	3.15	3.16	—	—

Facilities with electroplating and metal finishing processes are urged to evaluate rooftops for pollutant sources, such as exhaust vents, and update their SWPPP accordingly. Without such an evaluation, you may now be required to file a Notice of Intent (NOI) or your existing SWPPP may be incomplete.

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